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(54) Vent nozzle assembly for ducted flow leak detection system

(57) The vent nozzle assembly comprises a vent nozzle 17, 20 engaging a vent hole in the fluid duct assembly 13 and an interlocking ring 19 clamping the vent nozzle in place. In a ducted flow leak detection system a fluid carrying duct 11, particularly carrying hot air, is contained within a concentric outer layer of material, eg. fibreglass 13 of greater diameter to form an insulating air space containing a suitable insulating material 15. The outer layer includes one or more vent holes so that any duct leak into the insulating layer will be directed outwardly into contact with suitably adjacent leak detection means. Each vent hole includes a vent nozzle of the present invention, having a configuration designed to aid direction of the leak flow, retain the insulating material and prevent the ingress of fluids from external sources.

Fig.4.

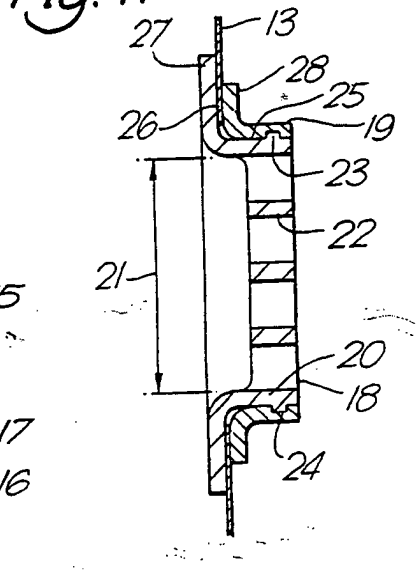
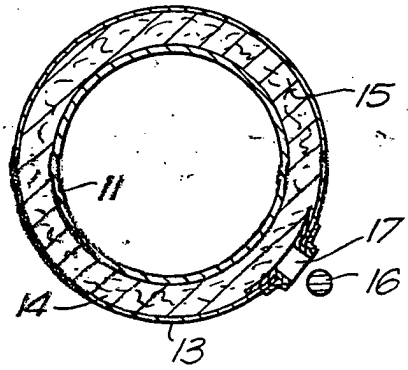


Fig.2.



At least one drawing originally filed was informal and the print reproduced here is taken from a later filed formal copy.

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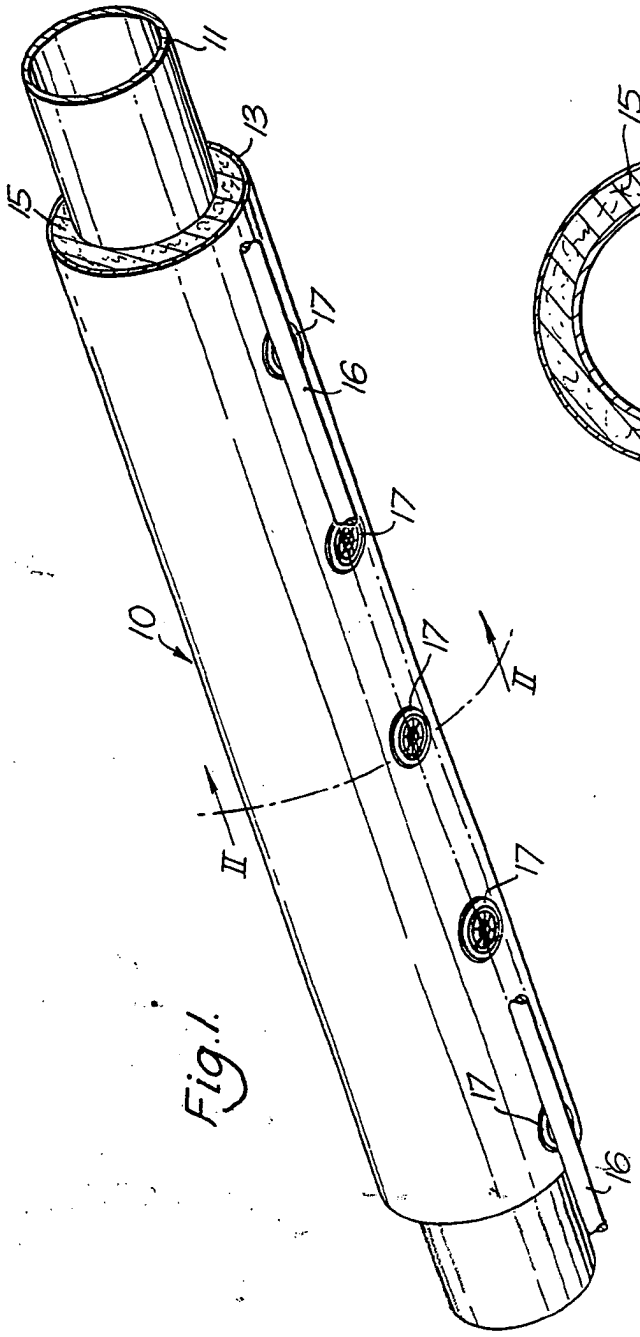


Fig.1.

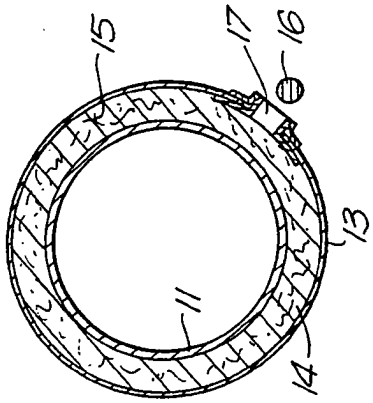


Fig.2.

Fig.3.

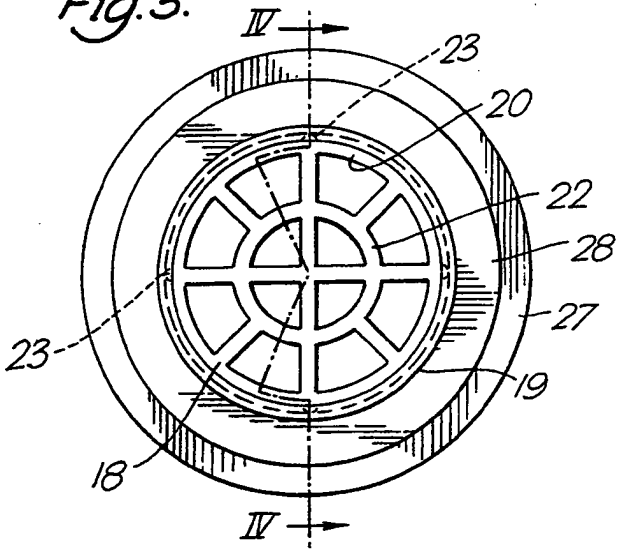
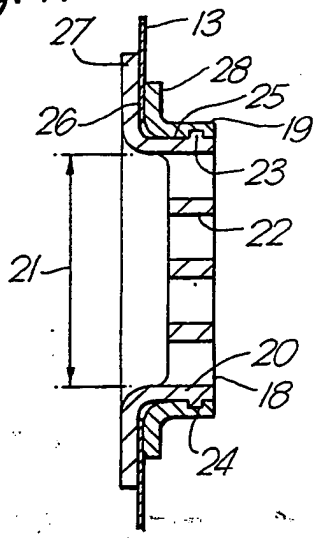


Fig.4.



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DUCTED FLOW LEAK DETECTION

This invention relates to ducted flow leak detection systems. More particularly it relates to leak flow venting means.

It is known, in connection with ducted systems carrying high temperature air, for example, to provide means for detecting the presence of leakages occurring particularly within the flow ducts and to initiate a shut-off sequence. This enables a leaking duct to be isolated which is essential in order to minimise adverse effects. For example, the fluid flow may be of high temperature and fluid loss may be detrimental. It may impair the function of the particular system or perhaps more importantly, since duct systems, in certain installations such as aircraft, lie closely adjacent other systems or load carrying structures, these may be seriously affected by the impingement of hot air upon them.

One known means of leak detection is by sensing wires able to detect an increase in localised temperature and, when a pre-determined temperature is exceeded, initiate a shut-off sequence, thus isolating the flow in that part of the system in which the leak occurs In order to ensure accurate detection, the leakage flow should be directionally controlled to ensure impingement or near impingement on the sensing wire. High temperature fluid flow duct assemblies generally comprise a flow duct of suitable material

contained within an outer concentric wrapper or sleeve of suitable material, for example, titanium/stainless steel foil or any other similar thin gauge flexible material. This outer layer is of suitable dimension with respect to the flow duct so as to define an insulating air space, which is packed with a suitable insulating material such as glass-fibre wool.

Apart from its insulating properties, this ensures that any leak flow will be constrained within the outer layer and to flow in a controlled manner through an appropriately positioned vent at some point or points along the duct length. The particular arrangement is very much a matter of design choice and one arrangement utilised a series of vents spaced at intervals along the duct length and positioned in alignment with an adjacent sensing wire.

The vent may simply be a hole in the outer layer but this is undesirable for a number of reasons and it is considered that discrete vent nozzles installed at each vent position will be more advantageous for the following reasons:-

The nozzle has three functions:-

1 directs any leak from the duct and constrained within the outer layer, towards the overheat sensing wire,

2 retains the insulation material which is positioned between the duct and the outer sleeve,

3 prevents the ingress of fluids which may be present externally running around the circumference of the outer sleeve and entering the insulating air space.

It is an object of the present invention to provide a vent nozzle for use in a ducted flow leak detection system.

According to the present invention there is provided a vent nozzle assembly for a ducted flow leak detection system comprising a vent nozzle for engaging a vent hole in a fluid duct assembly and an interlocking retaining ring for maintaining said vent nozzle in clamped engagement in said fluid duct assembly.

One embodiment of the invention will now be described by way of example only and with reference to the following drawings in which:-

Figure 1 is a pictorial representation of a portion of fluid flow duct installation.

Figure 2 is a section through the same installation looking along a line II-II in Figure 1.

Figure 3 is an elevation on a typical vent nozzle assembly in accordance with the invention.

Figure 4 is a section through an installed vent nozzle viewed indirection of arrows IV-IV in Figure 3.

Referring to the drawings, Figures 1 and 2 illustrate pictorially a portion of fluid flow duct installation 10 comprising an inner fluid flow duct 11 and a concentrically disposed outer sleeve 13 defining an insulation air space 14

packed with a suitable insulating material 15, for example glass fibre wool. Running longitudinally and closely adjacent the outer sleeve 13 is a sensing wire 16 forming part of a heat sensing circuit and able to detect an increase in localised temperature. In the arrangement of figure 1 the sensing wire 16 is locally shown removed to disclose a number of vent nozzle assemblies 17 located in leak apertures in the outer sleeve 13 and positioned in longitudinal alignment with the sensing wire 16. These vent nozzles may be positioned at isolated locations along the length or spaced at regular intervals, the preferred configuration.

Referring to Figures 3 and 4, vent nozzle 17 comprises a two part assembly of high temperature injection moulded non-metallic material, comprising a nozzle portion 18 and a flanged retaining ring 19. The nozzle portion 18 includes a flanged cylindrical portion 20 having a concentric bore therethrough with integrally moulded grid-like structure 22 over about one-half of its depth. Four equally spaced locking 'pips' 23 of semi-circular cross-section is integrally moulded in the outer surface of the cylindrical portion 20 for engaging a square-section annular recess 24 in the inner wall 25 of the retaining ring 19.

Figure 4 illustrates an installed vent nozzle assembly at one typical vent position in which a vent hole 26 is formed in the outer sleeve 13, the nozzle portion 18

inserted from within the outer sleeve 13 such that the nozzle portion 18 protrudes outwardly and is locked in position, as shown, by means of the engaged retaining ring 19, the annular flanges 27 and 28 on the respective parts sandwiching the outer sleeve 13, positive locking of the component parts maintained by engagement of the locking pips 23 in the annular recess 24. Assembly is achieved by simply pressing the two halfs of the vent nozzle assembly together.

CLAIMS

1 A vent nozzle assembly for a ducted flow leak detection system comprising a vent nozzle for engaging a vent hole in a fluid duct assembly and an interlocking retaining ring for maintaining said vent nozzle in clamped engagement in said fluid duct assembly.

2 A vent nozzle assembly according to claim 1 in which said vent nozzle includes a cylindrical body portion, a concentric flow passage extending therethrough, an annular concentric clamping and locating flange and means for engaging said interlocking retaining ring.

3 A vent nozzle assembly according to claim 2 in which said concentric flow passage includes over at least a portion of its depth a series of webs of grid-like configuration.

4 A vent nozzle assembly according to claim 1 in which said interlocking retaining ring includes a cylindrical body portion having a concentric bore for slidably engaging said vent nozzle, an annular concentric clamping and locating flange and means for lockingly engaging said vent nozzle.

5 A ducted flow leak detection arrangement comprising a fluid flow duct assembly including a duct, concentric duct insulation means comprising an outer layer of greater diameter than said duct to define an insulating air space, and insulation means within said insulating air space, said outer layer including one or more vent holes connecting said

insulating air space to atmosphere and a vent nozzle assembly associated with the or each vent hole and comprising a vent nozzle protruding outwardly from said outer layer and an interlocking retaining ring engaging said vent nozzle portion and the outer layer is clamped between the respective annular flanges of said vent nozzle and said interlocking retaining ring the arrangement being such that the or each installed vent nozzle is configured to:-

a) direct any leak from the duct, and constrained within the outer sleeve, towards the overheat sensing wire lying adjacent to the fluid flow duct assembly,

b) retain the insulation material within the insulating air space,

c) by its protrusion from the duct outer layer, prevent the ingress of fluids from external sources.

6 A vent nozzle assembly as herein specifically described with reference to the accompanying drawings.

7 A ducted flow leak detection arrangement as specifically described with reference to the accompanying drawings.